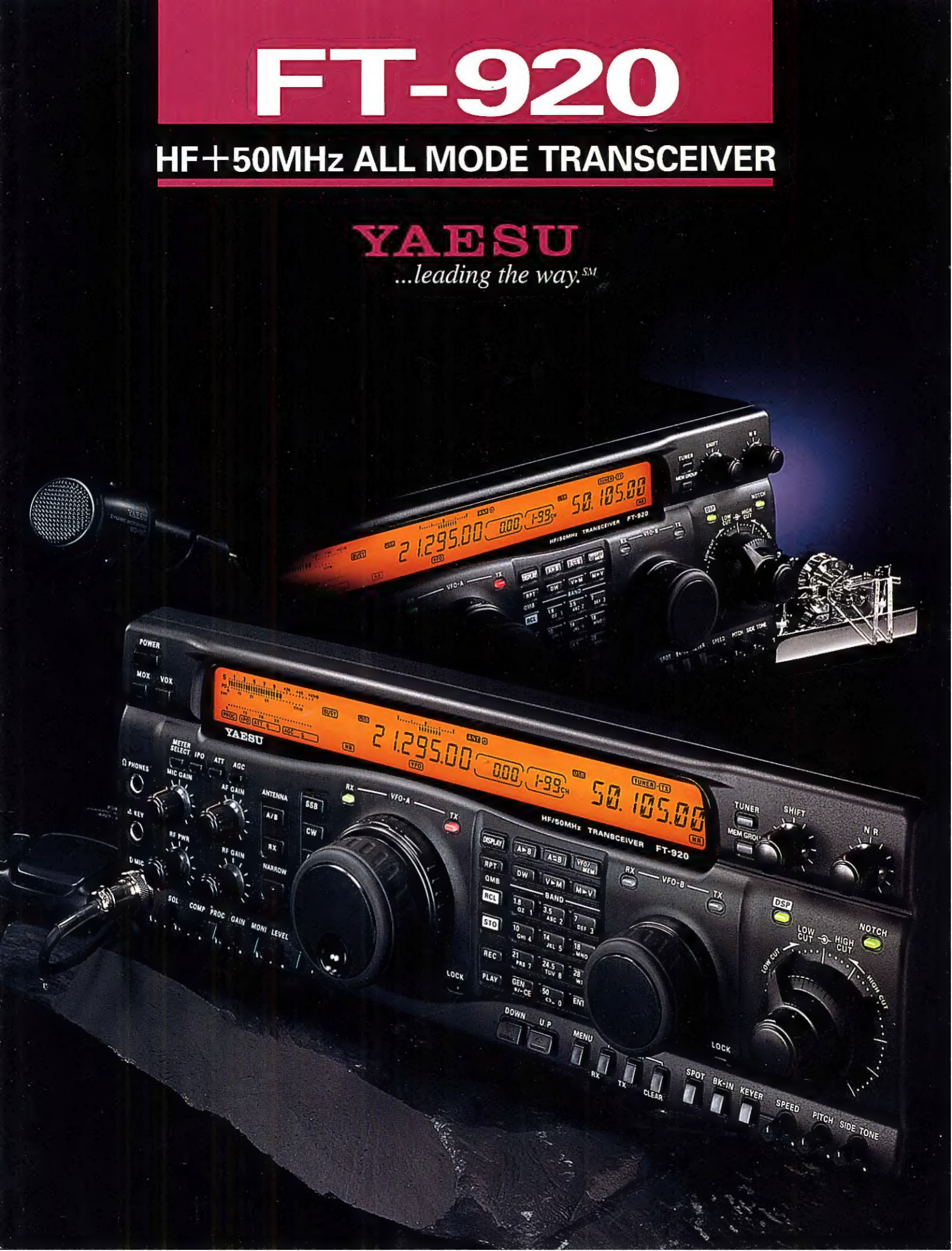
FT-920

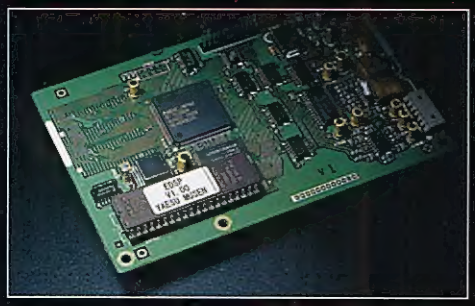
HF+50MHz ALL MODE TRANSCEIVER

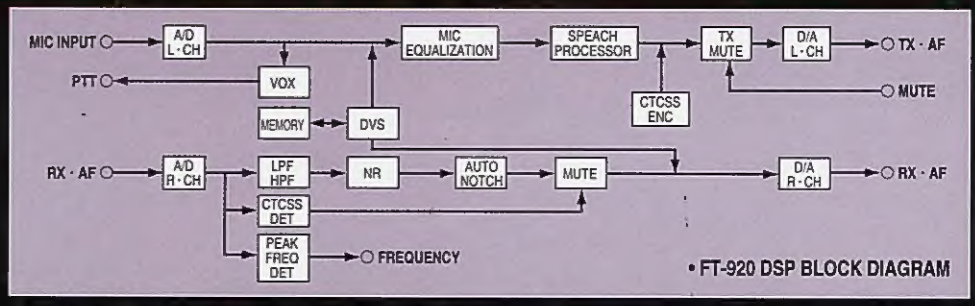
YAESU

...leading the way.SM



New-Design Digital Signal Processing (DSP) System features Industry-leading 33.3 MIPS (Million Instructions Per Second) Processing Speed for Leading-Edge Digital Operating Enhancement!

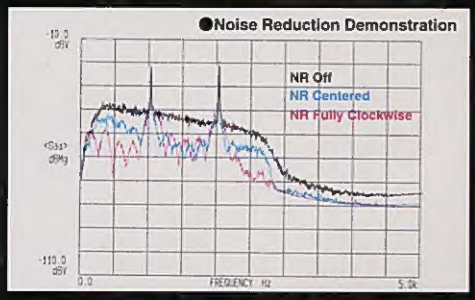




• FT-920 DSP BLOCK DIAGRAM

Two-Parameter Noise Reduction System improves signal-to-noise ratio!

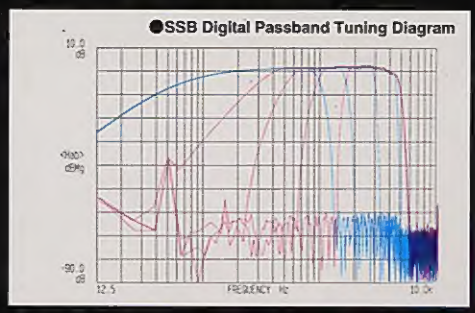
Building on the success of the FT-1000MP's EDSP system, Yaesu's engineers embarked on an ambitious project to optimize two parameters in DSP noise reduction technology--response time and feedback coefficient--to provide the best DSP-based noise reduction system in the industry. After thousands of hours of on-the-air measurements and circuit evaluations, the FT-920's NR (Noise Reduction) feature includes a total of 32 steps of adjustment, whereby these two parameters are modified and re-combined so as to provide the best degree of noise suppression consistent with low distortion of the desired signal. This adaptive filter actually "form fits" itself around the incoming signal, while rejecting random noise, providing you with the best chance ever of pulling out those weak ones!

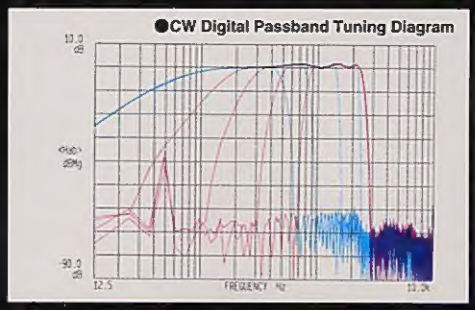


Dual-control DSP Passband Tuning combines with IF Shift for Outstanding Interference Rejection

Once the IF crystal filters have established the operating bandwidth, and the IF SHIFT control has determined the best center frequency of the passband, the DSP Dual Passband Tuning controls are used to provide a very tight shape factor and lower overall noise level. The DSP Low-Pass Filter provides 22 steps of adjustment (over the range 1.0~4.5kHz on SSB, 500Hz~2.25kHz on CW) of the upper-frequency limit, while the High-Pass Filter provides 42 steps of adjustment (100Hz~1.9kHz on SSB, 50Hz~950Hz on CW) of the low-frequency cutoff. The ergonomically-designed passband tuning controls include tabs which prevent confusing overlap,

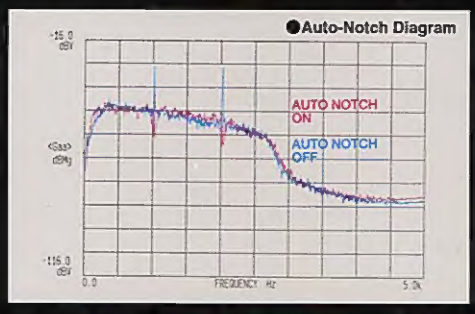
and the improved interference reduction provided by this feature lets you hear only that rare DX!





Automatic Seeking DSP Notch Filter cuts out annoying carriers or beat notes!

An additional and highly-beneficial feature of the DSP system is the automatic, seeking Notch filter. This advanced circuit detects the presence of one or more carriers in the (voice mode) passband, then generates a very narrow notching action to eliminate the offending tone. The notch depth is in excess of 35 dB.



Contest-ready High-quality Digital Voice Recorder!

Long hours of SSB contest operation can quickly weaken an operator's voice. But unique in this price class of transceivers is the FT-920's DSP-based Digital Voice Recorder (DVR). On transmit, the DVR can store as many as six repetitive "CQ Contest" type messages with a total recording time of 44 seconds (partitioned into messages of maximum lengths of 16 seconds (one message), 8 seconds (two messages), or 4 seconds (three messages). On receive, use the DVR to record and play back interesting or important messages for later reference. The high sampling rate for the DVR brings you exceptionally clear voice signal quality, with simple front-panel access to the recording and playback keys.

Exceptional Transmit Audio and Talk Power via DSP Mic Equalization and Digital Speech Processor!

The power of DSP-based audio pattern synthesis is yours with the FT-920's Microphone Equalization feature. Via the Menu system, the operator may choose, from among four distinct response contours, the one which best matches his or her voice. The transceiver then can focus all available transmitter power into the audio spectrum which you, yourself are generating, so as to improve your signal on the other end of the communications circuit.

In addition to the Mic Equalization feature, the FT-920 sports an exciting new Digital Speech Processor, which increases your talk power by a high-technology digital compression technique, which boosts the average power output from your transceiver with very low distortion. The Digital Speech Processor and DSP Mic Equalization combine to give you the most comprehensive array of transmit signal-enhancing tools available in any HF transceiver today!

DSP-based Transmit Voice Monitor!

For easy monitoring and adjustment of your speech quality characteristics (important when adjusting the Digital Speech Processor and/or Mic Equalization), the DSP Transmit Monitor circuit includes a front panel level control for setting a comfortable monitoring level.

Fast-acting DSP VOX Circuitry!

The FT-920's VOX (Voice-Operated T/R Control) utilizes the high speed of the DSP system to monitor the microphone input for activation of the transmitter. Much faster than analog VOX systems, the FT-920's VOX provides lightning-fast changeover from receive to transmit, important in contest applications.

Convenience during FM Operation provided via DSP Tone Systems!

During FM repeater operation on 10 and/or 6 meters, CTCSS Encoding and Decoding tone systems are provided via the DSP circuits. And when you need to generate DTMF tones on FM, the front panel keypad doubles as DTMF generator for repeater control applications.

FT-920

160-6 Meter Multi-Mode Transceiver with DSP!

Yaesu's engineers have dedicated themselves to the enhancement of Signal-To-Noise ratio in designing the FT-920. Since recovered audio is the most important consideration at both ends of the communications circuit, the FT-920 is particularly optimized for noise reduction, wide dynamic range consistent with excellent sensitivity, audio tailored to the operator's own voice pattern, and ease of operation.
The result is an efficient transceiver design without a peer in its price class.

Leading-edge features bring you the ultimate in transceiver performance from HF through the 50MHz band.

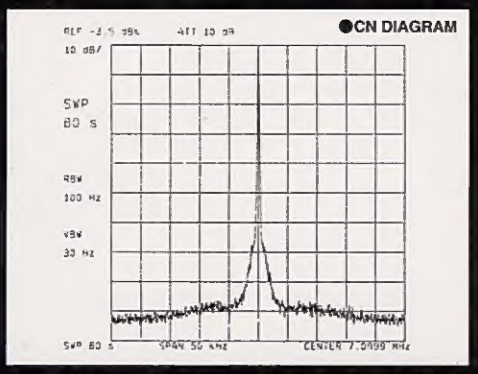
■The high-tech receiver front-end design, adapted from the FT-1000D/FT-1000MP legacies, allows you to compete on today's crowded bands! Utilizing an up-conversion technique, the four JFET doubly-balanced first mixer yields wide dynamic range and low noise figure. Following the first mixer, a four-pole monolithic crystal "roofing" filter at 68.985MHz protects the receiver stages to follow. This front-end architecture results in excellent image rejection characteristics for the receiver.

■Frequency-optimized front-end preamps provide the best noise figure for your operating circumstances! For frequencies above 24.5MHz, the Dual-Gate MOS FET RF preamplifier provides the highest gain and lowest system noise figure, important when you are searching for those weak 28 or 50MHz signals. For the lower bands, where extremely low noise figure may be less important than immunity from intermodulation and blocking due to strong signals, choose the lower-gain JFET preamp. The front-end amplifier choice you prefer will be maintained in the VFO and/or memory registers.

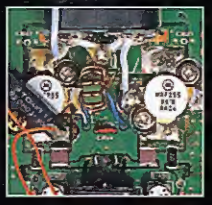
■Front-end bandpass filters protect the receiver circuits from strong out-of-band signals! Eleven low-loss bandpass filters provide excellent immunity from overload and 2nd-order inter-modulation from stations outside the currently-selected band. The bandpass filters for 7, 14, 21, and 50MHz exhibit high-Q characteristics which provide additional protection from signals relatively near the current band. Additionally, an input high-pass filter protects the receiver from strong AM broadcast signals (below 160 meters), and an input low-pass filter protects the receiver from television transmitter and other high-level VHF/UHF signals.

■All-band (160-6 Meters) Automatic Antenna Tuner controlled by 16-bit CPU provides quick frequency change plus protection for receiver circuitry! Up to 100 channels of antenna system tuning data may be stored automatically while you are operating; when you return to a particular frequency or memory channel, the Automatic Antenna Tuner will preset itself to the last setting in memory for that frequency. Immunity from 2nd-order intermodulation is enhanced by the capability to use the antenna tuner both on receive as well as transmit. Thus, the tuner acts as a band-pass filter to reject out-of-band signals which could cause inter-modulation.

■ High-Technology custom Direct Digital Synthesizer (DDS) yields clean local oscillator signals and fast lock time. The DDS circuitry produces very pure local oscillator carrier signals, contributing to the FT-920's high Carrier-to-Noise (C/N) ratio. The fast lock time yields outstanding digital mode and QSK CW results.



New-design 100Watt MOS FET amplifier provides full power from 1.8 through 54MHz! Utilizing rugged MRF255 FETs in a push-pull configuration, the FT-920's final amplifier stage produces 100 Watts of clean output power. The FT-920 is built into an aluminum diecast unibody chassis, which efficiently dissipates heat in conjunction with the amplifier's low-noise cooling fan.



Ergonomically designed for maximum operating efficiency!

Controlled by a 16-bit CPU, the FT-920 provides the ultimate in operating ease thanks to efficient, high-speed control data transfer.

■The multi-function tuning dials provide easy setup for split-frequency operating situations! When seconds count, you'll appreciate the ease of tuning with the two large tuning knobs in combination with the LED-illuminated VFO selector switches. The Sub VFO dial may also be used for Clarifier (RIT/XIT) tuning or memory channel selection.

■Extremely fine tuning steps, plus Yaesu's exclusive Shuttle Jog™ tuning ring, yield the smoothness of analog VFOs with the efficiency of digital technology. Variable tuning steps of 1Hz, 10Hz, or 100Hz are provided on SSB, CW, and Digital modes (10/100/1000Hz on AM/FM), allowing precise zeroing in on weak stations. And Yaesu's Shuttle Jog™ allows you to move quickly up or down the band with a simple twist of the Jog dial. When using tuning steps of 1Hz, precise tuning is made possible by the Enhanced Tuning Scale, which shows the precise amount of offset from the displayed frequency (which has resolution to 10Hz).

■Keyboard frequency entry, plus one-touch selection of Amateur bands, allow you to navigate quickly throughout the operating range of the transceiver! Utilizing a twin band-stacking VFO selection technique, the FT-920 provides two VFO registers for each Amateur band. Thus, you can store "favorite frequencies" such as 14.195MHz (SSB) and 14.025MHz (CW) on each band, with mode, bandwidth, antenna selection, and antenna tuner settings all being maintained in the separate VFO registers. Pressing the [ENT] key activates the direct frequency entry mode, which allows you simply to key in the desired frequency for instant QSY to that spot. Continuous coverage throughout the HF spectrum is provided for general short-wave listening, and the extended receive cover-age between 48MHz and 50MHz allows you to spot upcoming ionos-pheric openings as the Maximum Usable Frequency approaches the 6-meter band.

■Dual Watch system allow you to monitor two bands while looking for band openings! Set up the Dual Watch system, for example, to check both 10-meter and 6-meter calling frequencies when the bands seem "dead." The interval for checking the Sub VFO frequency may be user-selected, via Menu, to any value between 3 and 15 seconds (in one-second increments).

■Customize your FT-920's features using the extensive Menu system! A total of 73 "Set and Forget" aspects of transceiver performance may be adjusted via the Menu, allowing you to set up the FT-920 just the way you want it! Use the Menu to place that personal touch on such parameters as keyer weighting, tuning rate, and microphone equalization. You can even set up different maximum power output levels for the two antenna ports!

■Flexible 127-channel Memory system with Alpha-numeric labels! Besides the 99 "regular" memory channels, the FT-920 provides 5 "QMB" (Quick Memory Bank) memories, ten split-frequency memories (repeater splits can be accommodated on the "regular" memory channels), one "Call" channel for each amateur band, and one set of band-limit channels. All memories retain frequency, bandwidth, mode, and antenna selection data, and all memories except the QMB channels allow you to append an Alpha-numeric name or label (shown in the Sub VFO display area)--great for short-wave listening!

■Versatile Scanning functions allow you to keep a close watch on favorite frequencies or quiet bands! Choose between VFO-mode scanning, QMB channel scanning, Memory channel scanning, or programmed-limit band scanning. Memory channels such as WWV or local AM broadcast stations can also be tagged to be skipped during Memory channel scanning, if desired.

Advanced human-engineering and ease of integration into your station make the FT-920 a pleasure to use!

The most advanced visual display engineering available in the amateur radio industry.

■Yaesu's renown Omni-Glow™ LCD display provides a wealth of information about transceiver operating status. Utilizing a specially-engineered wide-angle viewing lens, the Omni-Glow™ display's reddish tint yields high contrast, exquisite detail and sharpness of display icons, plus very low eye fatigue during long operating sessions.

■Multi-function digital metering includes a "peakhold" feature for easy, precise transceiver level measure-ments. The digital meter scales bring you indication of received signal strength, transmitter output power, ALC level, SWR as measured at the transmitter side, input DC voltage, PA current, and speech processor compression level. And the "peak-hold" function provides a visual "dot" to indicate the maximum level encountered on any meter scale, allowing easy interpretation of fast-moving indications on the display.

■Enhanced Tuning Scale provides the owner unique visual operating aids.

●Digital Filter Relative Bandwidth
The Enhanced Tuning Scale's most popular display option is the indication of the relative bandwidth of the DSP's High-Cut and Low-Cut filters. Without taking your eyes away from the main frequency display area, you'll quickly be able to know the approximate roll-off characteristics of the DSP filters.

●Clarifier Offset
The direction and relative magnitude of the Clarifier's offset may be displayed using this option for the Enhanced Tuning Scale.

●CW Tuning Meter
For precise zeroing in on the center frequency of the CW passband, as programmed by the PITCH control, the Enhanced Tuning Scale provides a double-arrow (tu) meter to aid in precise frequency adjustment. This can be particularly helpful when using computer-based CW decoding terminal units.

●FM Center Tuning Meter
During FM operation, the Enhanced Tuning Scale may be used as a discriminator center meter for precise receiver tuning.

■Informative Display Multi-Function Panel selections:
●Clarifier frequency offset and direction
●CW Pitch frequency
●Repeater Shift magnitude and direction

Receiver Accessories

■IF Shift
The popular IF Shift feature allows you to roll off interference above or below the station you are listening to. In conjunction with the DSP's High-Cut and Low-Cut filters, you are equipped with powerful interference-rejection tools for easier copy of marginal signals on today's crowded bands.

■ IF Impulse Noise Blanker (NB)
For reduction of impulse noise such as that generated by automotive ignition systems, the IF Noise Blanker is an important tool for improving signal-to-noise ratio. A NB Level control is provided to allow the operator to optimize the Noise Blanker for the noise conditions encountered.

■AUTO AGC
The receiver's Automatic Gain Control (AGC) recovery time constant may be programmed, via Menu, to automatic default values which depend on the operating mode. The AGC time constant may also be set manually from the front panel, if desired.

Convenience Features for Interconnection with Accessories

■Dual Antenna Jacks plus Receive-Only Antenna Jack
Two TX/RX SO-239 (type "M") coaxial jacks are provided, eliminating the need for an external coax switch in many stations. Or you may dedicate one jack for low-power operation with a VHF/UHF transverter, if you like. The receive-only phono ("RCA") jack may be used for a low-noise receiving antenna such as a loop or Beverage, or it may be used in conjunction with a special receiving filter, preamplifier, or VHF/UHF receive converter.

■Data Jack for Connection to a TNC or Terminal Unit
Interfacing to digital-mode terminals is easy, thanks to the rear-panel DATA DIN connector. This jack accommodates either FSK or AFSK inputs from a TNC, and provides PTT (Push To Talk), fixed-level Audio output, and Squelch Status interconnections. The AFSK input is isolated from the microphone input, so you'll never need to worry about audio cross-talk during digital operation.

■Computer Control Interface Jack
For connection to a personal computer's serial data port, the FT-920 includes a convenient female DB-9 connector. Thanks to the built-in RS-232C level converter, no external interfacing box is required.

■AF OUT Jack
For connection to a tape recorder, data logger, or weatherfax decoder, the convenient AF OUT RCA connector on the rear panel provides fixed-level audio output, unaffected by the setting of the front-panel's AF GAIN control.

Operating Enhancements

■FM Repeater Features
Independently-optimized repeater operating features are provided for the 29MHz and 50MHz bands. CTCSS tone systems, repeater shifts, and transmitter deviation are completely separated between the two bands, reflecting the different regulatory and operational requirements on the 10 and 6 meter bands.

■Linear Amplifier Tuning Feature
A special feature allows a carrier to be generated at a preset power level, determined via the Menu system, for convenience when tuning up an external linear amplifier. Interfacing to an amplifier is simple, too, thanks to the provision of both open-collector transistor switching, as well as a mechanical relay, to accommodate most all amplifier relay coil voltages.

■All-Mode RF Power Control
For exact power output adjustments, important in many operating situations (especially with linear amplifiers), the FT-920's front panel RF PWR control is operational in all operating modes.

Outstanding Features bring Flexible Operation to the CW Specialist!

●Full Break-in and built-in Electronic Keyer
Thanks to the very quick switching time of the DDS system, the FT-920's QSK (full break-in) system provides outstanding waveform shape even at high speeds. The built-in electronic keyer circuit features keying speeds of 6 ~ 60wpm, plus independent dot:space and dash:space ratio control.

●CW REVERSE
Depending on the band in use, interference, or other factors, you may wish to use either USB-side or LSB-side injection for CW operation. The FT-920's CW-Reverse feature solves this problem! For example, when asking a 75-meter SSB station to switch to CW to build your CW DXCC country total, the FT-920 eliminates the need to tune around the band looking for the other station; just select "CW-LSB" and you'll be ready for action!

●CW SPOT
For precise alignment of your transmitted signal's frequency to that of the incoming station, use the CW SPOT feature. Pressing the SPOT key activates an audible tone which corresponds to the exact pitch of your signal when you transmit. The pitch, of course, tracks according to the setting of the front panel's PITCH control, and is very useful in DX pile-up situations.

●CW TUNING METER
An important feature of the Enhanced Tuning Scale is the CW Tuning Meter, which provides a visual indication of the pitch of the incoming signal as compared to your transmitted frequency (as established by the PITCH control).

●CW PITCH/Sidetone
Unlike on many rigs, the CW Sidetone on the FT-920 can be used for precise zero-beating with other stations (as described above in the "CW SPOT" discussion). Rotating the PITCH control allows adjustment of the offset transmitter frequency (and the corresponding center of the receiver's passband) over the range 300 ~ 1050 Hz. So if you like to listen to a rather low CW tone, you can still zero beat with ease when using the FT-920!

●Contest Message-Memory Keyer
The built-in message memory keyer, with recording/playback controls on the front panel of the transceiver, allows you to store and play back repetitive "CQ," "QRZ," or contest number messages. Four messages of up to 50 characters each may be stored, and the contest number automatically increments after each QSO. moreover, the Menu system allows you to truncate digits in the contest number, if you like (e.g. "T" for "0," "A" for "1," "N" for "9," etc.).

●Independent CW KEY Jacks on Front and Rear Panels
Depending on how you choose to configure your station, you may, for example, connect a keyer paddle to one jack (for use of the FT-920's built-in electronic keyer) and a two-wire keying line from your computer (for use with a contest software's keying interface). The "straight key" jack also provides PTT access via the ring contact on the key plug, for use if your computer or external keyer supports PTT control.

Supplied Accessories

MH-31B8 Hand Microphone
Operating Manual, and DC Power Cord.

SPECIFICATIONS

General

RX Frequency Range : 100.00 kHz～29.99999 MHz, 48.00000 MHz～56.00000 MHz
TX Frequency Range : 160～6 m amateur bands only
Operating Temperature Range : −10 °C～+50 °C
Frequency Stability : ± 10 ppm
± 2 ppm (w/optional TCXO-7)
Frequency Accuracy : < ±7 ppm (FM < ±500 Hz)
< ±3.5 ppm (FM < ±460 Hz w/optional TCXO-7)
Emission Modes : LSB, USB,CW, FSK, AM, FM (option)
Frequency Steps : 10 Hz/100 Hz/1Hz for SSB and CW,
100 Hz/1000 Hz/10 Hz for AM and FM
Antenna Impedance : 50Ω unbalanced
Power Consumption (Approx.) : RX (no signal) 2.0 A, Rx (signal present) 2.5 A,
TX (100W) 22A
Supply Voltage : DC 13.5V±10 %, negative ground
Dimensions (W x H x D) : 410 x 135 x 316 mm w/o knobs
Weight (Approx.) : 11.5 kg

Transmitter

Power Output : Adjustable up to 100 W (25 W AM carrier)
Modulation Types : SSB : J3E Balanced, filtered carrier
AM : A3E Low-level (early stage)
FM : F3E Variable reactance
FSK : J1D, J2D Audio frequency shift keying
Maximum FM Deviation : ±2.5 kHz (narrow), ±5.0kHz (wide)
FSK Shift Frequency : 170, 425, and 850 Hz
Packet Shift Frequency : 200 Hz
Harmonic Radiation : at least 50 dB below peak output (HF),
at least 60 dB below peak output (VHF)
SSB Carrier Suppression : at least 40 dB below peak output
Undesired Sideband Suppression : at least 50 dB below peak output
Audio Response (SSB) : not more than −6 dB from 400 to 2600 Hz (DSP off)
3rd-order IMD : −31 dB @ 100 W PEP, or better (14 MHz)
Microphone Impedance : 500～600Ω

Receiver

Circuit Type : Double-conversion Superheterodyne (Triple-conversion for FM)
Intermediate Frequencies : 68.985 MHz, 8.215 MHz (455 kHz for FM)
Sensitivity :

		SSB	AM	FM
100 kHz～ 150 kHz	(IPO ON)	–	–	–
150 kHz～ 250 kHz	(IPO ON)	5 µV	40 µV	–
250 kHz～ 500 kHz	(IPO ON)	4 µV	32 µV	–
0.5 MHz～ 1.8 MHz	(IPO OFF)	2 µV	16 µV	–
1.8 MHz～24.5 MHz	(IPO OFF)	0.2 µV	2 µV	–
24.5 MHz～28.0 MHz	(IPO OFF)	0.13 µV	1.3 µV	–
28.0 MHz～30.0 MHz	(IPO OFF)	0.13 µV	1.3 µV	0.25 µV
48.0 MHz～54.0 MHz	(IPO OFF)	0.13 µV,	1.3 µV	0.25 µV

Selectivity (−6dB/−60 dB) : SSB, CW 2.4 kHz/5.0 kHz
CW 500 Hz/1.8 kHz w/optional CW filter YF-116C
AM 6 kHz/14 kHz w/optional AM filter YF-116A
FM 12 kHz/25 kHz w/optional FM Unit FM-1
Squelch Sensitivity : < 2 µV (@ SSB, CW, AM 1.8 MHz～56 MHz, IPO OFF)
< 0.32 µV (@ FM 28 MHz～56 MHz, IPO OFF)
IF Rejection : < 70 dB (HF), < 50 dB (VHF)
Image Rejection : < 70 dB (1.8 MHz～56 MHz)
IF Shift Range : ±1.2 kHz
AF Notch Rejection : 35 dB or better
Clarifier Tuning Range : ±9.99 kHz
Maximum Audio Output : 1.5 W (@ 4Ω, THD 10%)
Audio Output Impedance : 4～8Ω

Automatic Antenna Tuner

Impedance Range : 16.7Ω～150Ω unbalanced (1.8 MHz～28 MHz)
25.0Ω～100Ω unbalanced (50 MHz)
Frequency Range : 160 m～6 m amateur bands
Matching Time : <30 seconds
Matched SWR : < 1.4:1

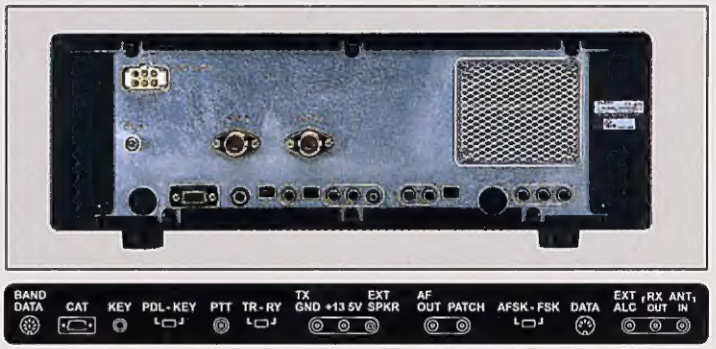
Specification subject to change, in the interest of technical improvement, without notice or obligation.

Optional Accessories

■Desk-Top Microphone
MD-100A8X

■Stereo Headphone
YH-77STA

■External Loudspeaker
with Audio Filter
SP-8



■FM Unit
FM-1

IF Crystal Filter (8.215MHz)

■CW Filter (500Hz)
YF-116C

■AM Filter (6kHz)
YF-116A

■TCXO Unit (2ppm)
TCXO-7

■AC Power Supply (25A)
FP-1030A

■AC Power Supply (25A)
FP-1025A (U.S.A. Only)

YAESU MUSEN CO., LTD.
1-20-2 Shimomaruko, Ota-Ku, Tokyo, 146, Japan

YAESU U.S.A.
17210 Edwards Rd., Cerritos, CA 90703, U.S.A.
YAESU INTERNATIONAL DIVISION,(Caribbean, Mexico, Central & So. America)
7270 NW 12th St., Suite 320, Miami, FL 33126, U.S.A.

YAESU EUROPE B.V.
Snipweg 3, 1118DN Schiphol, The Netherlands

YAESU UK LTD.
Unit 2, Maple Grove Business Centre, Lawrence Rd., Hounslow, Middlesex, TW4 6DR, U.K.

YAESU GERMANY GmbH.
Am Kronberger Hang 2, D-65824 Schwalbach, Germany

YAESU HK LTD.
11th Floor Tsim Sha Tsui Centre, 66 Mody Rd.,
Tsim Sha Tsui East, Kowloon, Hong Kong

B9200193 Printed In Japan.